Section 2
Project and Facility Description

2.1 Introduction

Riverside Public Utilities (RPU) proposes to build and operate a nominal 96-megawatt (MW) simple-cycle power plant on a 12-acre fenced site within the City of Riverside, California. This proposed facility is referred to as the Riverside Energy Resource Center (RERC) Project (Project). RPU will develop, build, own and operate the facility.

RERC will supply the internal needs of the City of Riverside during summer peak electrical demands. In addition, RERC in combination with RPU's 40 MW Springs Generation Project, will serve the City's minimum emergency loads in the event RPU is islanded from the external transmission system upon which it relies for power[1]. None of the power from RERC will be exported outside of the City.

RPU's goals and objectives are to provide its customers with a reliable source of electric service at a reasonable power cost.

As a municipal utility, Riverside Public Utilities' first obligation is to provide its customers with safe, reliable and highly quality electric services at low, fixed rates. The City of Riverside has steadily grown in population throughout the 1900s, particularly since 1970. The City nearly doubled in population between 1970 and 2003. Over the years, the City's load demand has also increased. Currently, there is a need for 150 MW of peaking power in 2005. Application of the City's risk management policy requires the capacity to be divided between energy markets. This results in a need for a minimum of 50 MW of internal generation by the summer of 2005. In addition to serving the load, the internal generation will help relieve the loading on the 230/69kV transformers at Southern California Edison Vista Substation, which currently supplies the city and is approaching their electrical limits. The City's peak demand is expected to grow from its current 2003 peak demand of 517 MW to an estimated 570 MW peak over the next five years. The City currently meets this demand by a combination of City-owned generation participation such as SONGS Units 2 and 3, Palo Verde Units 1, 2 and 3, the Intermountain Power Project in northern Utah and Hoover Dam. The City also has long-term and short-term power supply contracts with DG&T, Bonneville Power Administration and the California Department of Water Resources that begin to expire in 2005, and cannot be extended. The proposed power plant will reduce the City's reliance on volatile power purchases, relieve the power loadings on the Southern California Edison (SCE) Vista Substation and increase the City's ability to serve its customers

[1] Riverside Public Utilities interconnects to California's transmission system through Southern California Edison's Vista Substation. The Vista Substation is nearing maximum capacity, is approximately 45 years old and is located close to the San Andreas Fault.

reliably at reasonable power cost. This generation will also provide a source of emergency power in the event of a power grid blackout.

The California Energy Commission (CEC) has exclusive jurisdiction to certify sites and related thermal power plants of 50 MW or more in capacity and all related facilities that are dedicated to or essential to the operation of a proposed power plant. The CEC may exempt thermal power plants from the certification process if the project is less than 100 MW and has:

- No unmitigated adverse impacts on the environment
- No unmitigated adverse impacts on energy resources

Because the project is not expected to have any adverse impacts on the environment or energy resources, RPU is preparing a Small Power Plant Exemption (SPPE) in accordance with the CEC's Power Plant Site Certification Regulations.

2.2 Site Location and Layout

The proposed site is owned by the City of Riverside and is located adjacent to the City of Riverside's Wastewater Treatment Plant (WWTP) in a light industrial/manufacturing area. The WWTP is located on the west side of the Project and includes a 3.3 MW cogeneration facility that is operated on digester gas from the treatment plant. The primary source of raw water to the RERC will be reclaimed water supplied by the City's WWTP. In addition, the 3.3 MW cogeneration plant at the WWTP will be a source of power to black start the RERC plant. The two facilities will be cross-tied for both electrical power and compressed air.

The RERC will consist of two aero-derivative combustion turbine generators with SCRs, an on-site substation, approximately 1.75 miles of 69kV transmission line, natural gas and water supply interconnection, and on-site administration building and warehouse. The plant will be used for summer peaking needs between May and October and all power produced will stay entirely within RPU's system.

The power plant and associated administration building and warehouse will occupy approximately 8 of the 12 acres with the additional 4 acres reserved for equipment storage and construction parking.

The entire plant perimeter will be fenced with a combination of chain-link fencing and architectural block walls with landscaping installed per City of Riverside standards. The plant will have paved roads and parking areas. RPU will pave the main power block area and remaining areas will be covered with crushed rock. Storm water that does not naturally infiltrate within the graveled areas will be routed to a retention/infiltration basin. Overflow from the retention/infiltration basin, if it occurs, will flow to the City's storm water system.

2.3 Alternative Sites

RPU evaluated alternative sites during the planning stage of the Project. The main criteria considered in selecting a suitable site included appropriate land area, environmental compatibility, proximity to existing utilities including transmission lines, natural gas pipelines and water supply, and compatibility with local land uses and zoning. This screening process narrowed the number of potential sites to two, with the proposed site offering the greatest potential to meet RPU's goal while minimizing potential environmental impact.

2.4 Schedule

Construction of the RERC is anticipated to last approximately nine months, following approval by the CEC and once all permits and authorizations are in place. Commencement of construction is anticipated in October 2004, with commercial operation of the first unit anticipated in May 2005 with the second unit available in July 2005 for the summer peaking season.

2.5 Process Description

The plant will consist of two General Electric LM6000 PC SPRINT NxGen combustion turbine generators with the SPRINT Power Boost System equipped with inlet air chiller coils, exhaust ducting, flue gas treatment system to meet the proposed air emission limits, a common chiller package with cooling tower, gas compressor equipment, water storage and treatment facilities, emission monitoring system, zero liquid discharge (ZLD) wastewater treatment system and electrical transmission and interconnection system and associated auxiliary systems and equipment.

The plant will operate primarily to support Riverside summer peaking demands during the months of May through October. The plant may occasionally operate at other times during the year for emergencies or testing purposes. The nominal net generating capacity of both units will be approximately 96 MW at 72.2ºF[2]. The plant will be capable of operating with one or both gas turbines.

The plant will be permitted for approximately 2,700 hours in total from both units. While the plant is capable of 24/7 operations, typical operation will be for a few hours per day to address peak demands. The plant is capable of at least three starts/stops per day.

The stack NO_x emissions will be controlled to 2.5 ppm volume dry (ppmvd) corrected to 15 percent O_2 by a combination of water injection in the combustion turbine generators (CTG) and selective catalytic reduction (SCR) systems in the exhaust duct. Carbon monoxide will be controlled to 6 ppmvd at 15 percent O_2 using the oxidation catalyst system. Aqueous ammonia slip will be limited to 5 ppmvd. The CO catalyst and SCR will be mounted directly in the gas turbine exhaust. Ammonia will be the reducing agent that is used to reduce the NO_x content in the gas stream to the guaranteed level. The ammonia storage, forwarding and vaporizing skids will be included. Fuel for the CTGs will be pipeline-quality natural gas.

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[2] 72.2ºF is the average site temperature during the months of May to October.

The plant will have a black-start capability relying on 480V and 4160V power supplied by the reciprocating engines at the adjacent WWTP cogeneration plant.

Table 2.5-1 provides a description of the major equipment items selected for the RERC Project including the capacities and general features.

Table 2.5-1 Equipment Items Selected for RERC

Equipment	QTY	Nominal Capacity	Description
Combustion Turbine Generator	2	~50,000 kW gross	GE LM-6000 SPRINT
SCR System	2	2.5 ppmvd Nox	SCR System with ducting and stack
Aqueous Ammonia Storage Tank	1	12,000 gallons	19% aqueous ammonia
Chiller/Cooling Tower	1	3,200 ton	Common chiller and cooling tower system
Natural Gas Compressors	3	12 MSCFD, 725 psig, 573 hp	50% capacity each recip compressor
Demineralized Water Treatment System	2	125 gallons per minute	RO and EDI system for demineralized water
Oil/Water Separator	1	500 gallons oil storage	Above ground, single wall, 10 ppm oil
Demineralized Water Tank	1	300,000 gallons	Field fabricated steel tank, storage
Raw Water Storage Tank	1	500,000 gallons	Field fabricated steel tank, storage
Continuous Emissions Monitoring (CEM) System	2	NA	O_2, NOx, CO
Generator Step Up (GSU) Transformers	2	42/56/70 MVA	OA/FA/FA, 138Y – 13.8kV, outdoor, oil-filled, two winding, 3 phase, copper windings.

Table 2.5-2 describes the expected performance of the RERC facility.

Table 2.5-2 Expected Performance of RERC Facility

Expected Performance	Units	Value
Gross Power Output	KW	99,600
Net Power Output	KW	96,050
Fuel Consumption	MMBtu/hr HHV	940.5
Net Heat Rate	Btu/kWh HHV	9792
Annual Operating Hours	Hr/yr per CTG	1350

Preliminary engineering indicates that the following on-site RERC Project facilities will include:

- Two simple-cycle combustion turbine generators with ducting for SCR systems and 80 foot tall stacks
- SCR systems for oxides of NOx control
- SCR system tempering air fans and dilution air blowers
- Continuous emission monitoring and data acquisition systems
- An oxidation catalyst for CO control
- Chillers, cooling tower, pumps and auxiliary equipment

- Generator step-up transformers
- Station service transformers
- Aqueous ammonia storage tank
- Zero liquid discharge (ZLD) system
- Water treatment system
- Natural gas compressors
- Fire protection system
- Equipment enclosures
- Storage tanks for demineralized water and raw water
- Administration/control building and warehouse
- Parking
- CTG Control Houses
- Plant wastewater pumps
- Outdoor lighting systems

Off-site improvements include:

- Approximately1.75 miles of 69kV sub-transmission line in an easterly direction to RPU's existing Mt. View Substation

2.5.1 Combustion Turbine Generation Equipment

The plant will consists of two General Electric LM6000 PC NxGen combustion turbine generators (CTG) with SPRINT Power Boost System. The NxGen package is the latest evolutionary step in the LM6000 to enhance reliability and reduce inadvertent trips through design improvements in the overall engine package. The core LM6000 and associated gas path remains unchanged. Demineralized water will be injected into the engines for both power augmentation (as part of the SPRINT[3] system) and emissions control.

The nominal net generating capacity of the simple cycle system will be approximately 96 MW at 72.2°F (annual average site temperature) and will primarily be operated as a peaking plant during the months of May to October, but may operate at other times during the year for emergency or testing purposes. The plant will be capable of operating with one or both gas turbines operating. The combustion turbine units can deliver peak power at 100 percent output. Under peaking load operation, the combustion turbine can operate 14 hours per day, five days a week. However, the plant design will also permit

[3] SPRINT is General Electric's acronym for the Spray Intercooling system that injects water ahead of the low pressure and high pressure compressors.

operation 24 hours a day, seven days a week (base load operation). The plant shall be capable of up to three starts/stops per day.

The CTGs will come equipped with one common chiller package. The chiller package consists of equipment necessary to condition or chill the inlet air to the gas turbine and maintains the desired power output during hot day conditions. A central controls system will be provided for controlling the entire inlet air chiller system. The system proposed will monitor and control the chiller and all chiller related auxiliary equipment. Operation and monitoring of the system will be provided, locally, through full color graphical touch screen HMI interface mounted in the package enclosure. The packaged chilled water system will include one 3,200-ton electric chiller, dual-chilled water pumps, dual condenser water pumps, one packaged cooling tower with three cells, motor control center (MCC) and chiller controls. The chiller refrigerant will be R123 or R134A, both of which are considered environmentally safe CFC-free refrigerants.

2.5.2 Emission Control Equipment

Air emissions from the combustion of natural gas in the CTGs will be controlled using best available control technology (BACT). These state-of-the-art systems will allow RPU to meet a wide range of electrical system operating scenarios while complying with applicable laws, ordinances, regulations and standards (LORS) and California's South Coast Air Quality Management District (SCAQMD) requirements for emissions of carbon monoxide (CO), oxides of nitrogen (NO_X), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), oxides of sulfur (SOx_2), volatile organic compounds (VOCs) and toxic compounds. A continuous emissions monitoring system (CEMS) will be installed to monitor the stack emissions of NOx and CO.

The emission control system for each CTG consists of the following major components:

- Oxidation catalyst to control CO, VOCs
- Selective catalytic reduction system (SCR) to control NO_X

The gas turbine combustors control the CTG exhaust CO emissions to approximately 40 ppmv and NO_X emissions to approximately 25 ppmvd over the range of operating loads (50-100 percent power). An oxidation catalyst will be provided to further reduce CO (1-hr average) emissions to 6.0 ppmvd. The CO catalyst will also reduce the VOC (1-hr average) emissions to less than 2.0 ppmvd. This catalytic system will promote the oxidation of CO to carbon dioxide (CO_2) and VOC to CO_2 and water without the need for additional reagents.

Each turbine will also be equipped with a SCR system to control NO_X concentrations in the exhaust gas emitted to the atmosphere to no more than 2.5 ppmvd (1-hour average concentration excluding startups) at 15 percent O_2 from the gas turbines. The SCR process uses 19 percent aqueous ammonia as a reducing agent to catalytically convert NO_X present in CTG exhaust to molecular nitrogen (N_2) and water vapor. Aqueous ammonia is chosen for this Project because it is easier to transport and store than gaseous ammonia and because it presents minimal health risk in the event of an accidental discharge. Ammonia slip, or the concentration of unreacted ammonia in the exiting exhaust gas, will be limited to no more than 5 ppmvd at 15 percent O_2.

The SCR system includes ductwork tempering air fans, catalyst bed, ammonia storage system, ammonia vaporization skid and ammonia injection system. Aqueous ammonia will be delivered periodically to the site via tank truck. The trucks include vapor recovery systems to prevent the discharge of ammonia vapors into the atmosphere while the storage tank is being filled. Aqueous ammonia will be pumped from the storage tank, vaporized, then injected into the duct upstream of the SCR catalyst. The ammonia evaporization skid will be provided with the two (2) X 100 percent dilution air fans and four (4) X 33 percent heater elements housed in a common heater box. NEMA 4x junction boxes will be provided for power, control and instrumentation cabling connections.

The design and performance characteristics of the SCR and CO oxidization system are summarized as detailed in the below Table 2.5-3:

Table 2.5-3 SCR and CO Oxidation System

Controlled NO_X Emissions	2.5 ppmvd at 15% O_2
Controlled CO Emissions	6.0 ppmvd at 15% O_2
Ammonia (NH_3) Slip	5.0 ppmvd at 15% O_2
Stack Height	80 Feet
Tempering Air Fans (per unit)	2 x 100% Fans
SCR Catalyst Type	Cormetech - Valadium-based ceramic honeycomb, 90% Conversion Efficiency
CO Catalyst Type	Engelhard - Precious metal carrier on alumina, 95% Conversion Efficiency
Ammonia Type	19% Aqueous
Expected Gas Side Pressure Drop	Less than 12.0" WC
Noise Criteria – Near Field at 3 ft	85 dB(A)
Noise Criteria – Far Field at 90 ft (Plant Boundary)	65 dB(A)
PLC Type	GE Fanuc 90 Series

PM_{10} and $PM_{2.5}$ emissions consist primarily of hydrocarbon particles formed during combustion. PM emissions will be controlled by inlet air filtration and by the use of pipeline quality natural gas fuel, which contains minimal particulate matter.

SO_2 emissions will also be controlled by the use of pipeline quality natural gas fuel, which contains only trace quantities of sulfur.

One CEMS system will be provided for each of the combustion turbine packages. The proposed CEMS utilizes extractive sampling technology to monitor outlet NOx, CO and O_2 concentrations. The system will also be used to predict ammonia slip (NH_3) emissions. Stack flow rates will be calculated based upon measured fuel consumption rates and will be used to determine hourly mass emissions in accordance with South Coast Air Quality Management District (SCAQMD) and U.S. Environmental Protection Act (U.S. EPA) regulations. A common data acquisition system (DAS) will be located in the control room. The CEMS will generate a log of emissions data for compliance documentation and will activate an alarm in the plant control room if stack emissions exceed specified limits. The DAS will calculate all average emission rates and will be the source of historic CEMS output data. The CEMS and DAS will be certified for operation and maintained in accordance with SCAQMD and U.S. EPA regulations.

2.6 Fuel System

Natural gas fuel will be supplied to RERC from a Sempra transmission line that passes next to the northeast corner of the site boundary. A short (~140 foot) natural gas service line will be constructed to connect from the existing Sempra transmission pipeline to the on-site meter station. The pipeline has a Maximum Allowable Operating Pressure (MAOP) of 584 psig and an operating pressure that varies between 350 and 537 psig.

Three fuel gas compressors, each of which is capable of supplying the needs of one of the two CTGs, will be installed to boost the natural gas pressure to the minimum pressure of 725 psig to provide adequate pressure at the CTG packages. Inlet scrubbers and a common outlet coalescing filter will remove particulate matter and condensate from the fuel gas.

The CTG packages will be supplied with a natural gas fuel system that utilizes an electronically controlled fuel-metering valve. For full-load operation, the gaseous fuel must be supplied to the CTG at 675 psig ± 20 psig (4.658 kPag ± 0.138 kPag).

Natural gas for the Administration Building and other domestic uses will be supplied via a separate connection to Sempra's gas distribution system.

2.7 Water Supply and Use

The power plant's various water uses include cooling tower makeup, combustion turbine water injection for NOx controls and Sprint Injection, potable water for domestic use and fire protection water. The water balance diagram is presented in the process flow diagram in Figure 2.7-1.

2.7.1 Water Requirements

Potable water for sanitary use will come directly from the City's general water supply. The adjacent WWTP will supply reclaimed water for plant process water. The reclaimed water will be used as a make up water source for the Project's cooling water and process water to the demineralized water treatment plant. Reclaimed water will be supplied from the WWTP directly adjacent to the proposed plant site. Landscaping will be irrigated with reclaimed water from the WWTP as well. A separate connection to the City of Riverside potable water system, with an approved backflow preventer, will be made to supply fire water to the plant. Layout of the fire water loop and piping, size of piping, spacing of hydrants and equipment or buildings protected by sprinkler systems will be designed according to National Fire Protection Association (NFPA) standards and local requirements of the City of Riverside Fire Department. Proposed connection points for the potable and fire water supply is in Acorn Avenue, approximately 60 feet from the southwest corner of the site.

The maximum water requirements are shown in the process flow diagram (Figure 2.7.1), which is estimated based on a 100 percent load at ambient temperatures of 100°F. The estimated water requirements are 219.64gpm, with 16 hours of operation per day, the water consumption will be 0.221 million gallons/day.

2.7.2 Water Supply and Treatment Systems

Reclaimed water from the WWTP will be used for the cooling tower makeup and demineralized water treatment plant process water requirements. The quality of the reclaimed water supply, based on City reports, is shown in Table 2.7-1 below. This table also shows the design concentration for various constituents in the Reclaimed water when the plant operates at the highest ambient temperature of 115°F.

Table 2.7-1 Water Quality, Riverside, California

Constituent, (mg/l)	Reclaimed Water	City Water	Demin Plant Rejects	Cooling Tower Blowdown
Ca	67.40	0.00	249.40	303.3
Mg	12.60	0.00	46.70	56.70
Na	94.50	40.00	349.70	425.25
HCO3	169.00	0.00	625.70	760.50
SO4	81.90	55.50	303.10	368.55
CL	137.00	30.00	507.40	616.50
NO3	10.00	25.00	36.80	45.00
SiO2	15.00	0.00	55.50	67.50
TDS	587.60	336.00	2175.00	2644.20
Blowdown Quantity, gpm	0.00	0.00	50.64	23.71

The plant will contain a 500,000-gallon raw water tank. The tank will provide makeup water. Raw water transfer pumps will deliver reclaimed water to the cooling tower as makeup and provide the feed to the plant demineralized water treatment equipment.

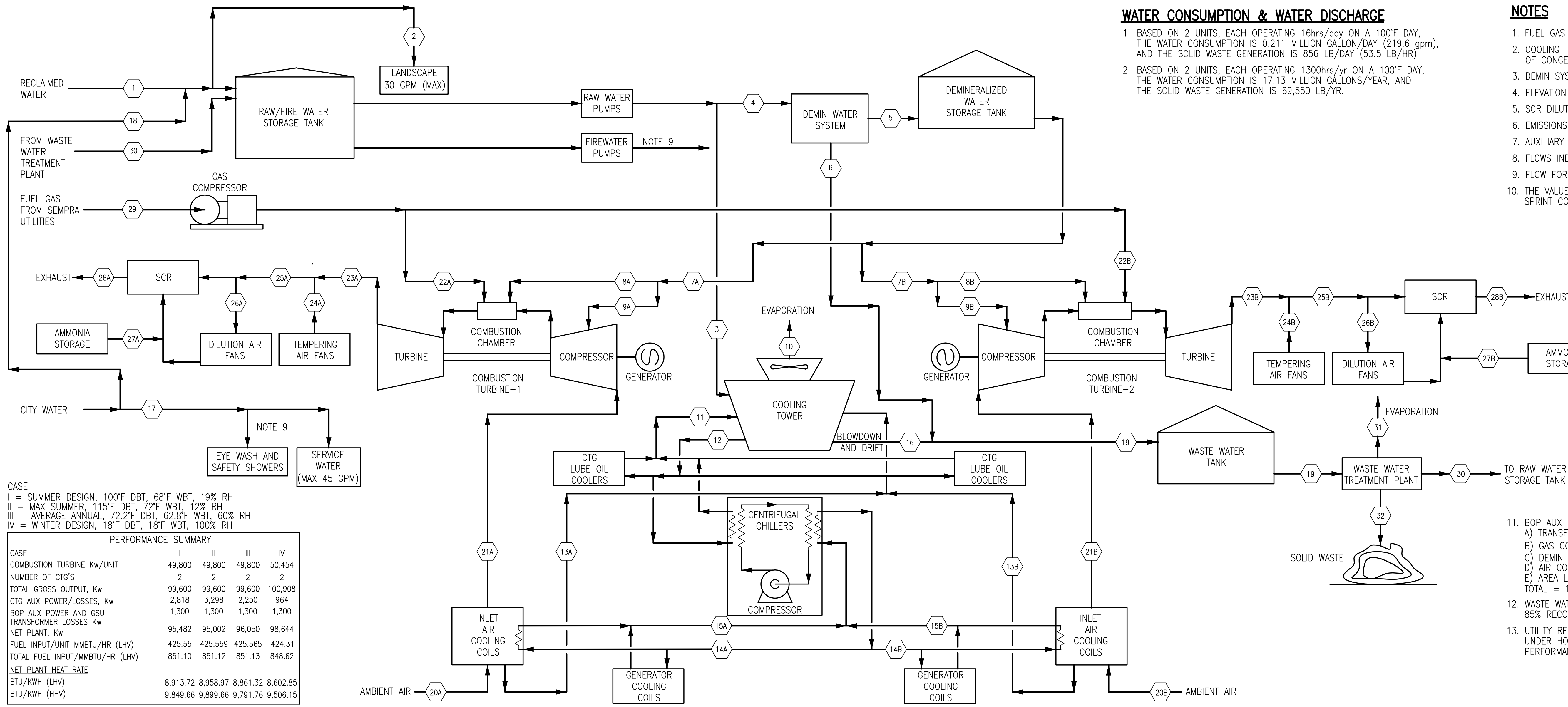
2.8 Wastewater

2.8.1 Process Wastewater

The RERC will utilize a ZLD system that reclaims most of the plant effluents and the remaining sludge is evaporated to produce a solid disposable waste, thus eliminating the need to discharge process wastewater to the WWTP.

2.8.2 Storm Water

The storm water management system for RERC will be designed to collect and route storm water to an on-site retention/infiltration basin. The storm water retention basin will be sized to contain the difference in runoff volume between pre and post development of



WATER CONSUMPTION & WATER DISCHARGE

1. BASED ON 2 UNITS, EACH OPERATING 16hrs/day ON A 100°F DAY, THE WATER CONSUMPTION IS 0.211 MILLION GALLON/DAY (219.6 gpm), AND THE SOLID WASTE GENERATION IS 856 LB/DAY (53.5 LB/HR)
2. BASED ON 2 UNITS, EACH OPERATING 1300hrs/yr ON A 100°F DAY, THE WATER CONSUMPTION IS 17.13 MILLION GALLONS/YEAR, AND THE SOLID WASTE GENERATION IS 69,550 LB/YR.

NOTES

1. FUEL GAS HHV = 1011.51 BTU/SCF.
2. COOLING TOWER BLOWDOWN BASED ON 4.5 CYCLES OF CONCENTRATION.
3. DEMIN SYSTEM REJECT BASED ON 31.25% REJECT WATER.
4. ELEVATION = 730 FT. ABOVE MEAN SEA LEVEL.
5. SCR DILUTION FLOWS ARE UNDER HOLD.
6. EMISSIONS ARE GUARANTEED VALUES AT BASE LOAD OPERATION.
7. AUXILIARY LOADS ARE PRELIMINARY.
8. FLOWS INDICATED ARE DERIVED FROM BID DOCUMENT.
9. FLOW FOR STREAM NUMBER IS TYPICALLY ZERO.
10. THE VALUES LISTED ON THIS DRAWING ARE BASED ON LM 6000 SPRINT COMBUSTION TURBINE WITH NATURAL GAS OPERATION.
11. BOP AUX POWER LOADS:
    A) TRANSFORMER LOSSES = 2 X 135.6Kw
    B) GAS COMPRESSORS = 2 X 573 HP
    C) DEMIN PLANT = 60 HP
    D) AIR COMPRESSORS = 50 HP
    E) AREA LIGHTING, HVAC AND MISC LOADS = 100 Kw
    TOTAL = 1296 Kw, USE = 1300 Kw
12. WASTE WATER TREATMENT PLANT WILL OPERATE AT 85% RECOVERY.
13. UTILITY REQUIREMENT FOR WASTE WATER TREATMENT PLANT ARE UNDER HOLD AND ARE NOT ACCOUNTED FOR IN THE PLANT PERFORMANCE.

CASE
I = SUMMER DESIGN, 100°F DBT, 68°F WBT, 19% RH
II = MAX SUMMER, 115°F DBT, 72°F WBT, 12% RH
III = AVERAGE ANNUAL, 72.2°F DBT, 62.8°F WBT, 60% RH
IV = WINTER DESIGN, 18°F DBT, 18°F WBT, 100% RH

PERFORMANCE SUMMARY

CASE	I	II	III	IV
COMBUSTION TURBINE Kw/UNIT	49,800	49,800	49,800	50,454
NUMBER OF CTG'S	2	2	2	2
TOTAL GROSS OUTPUT, Kw	99,600	99,600	99,600	100,908
CTG AUX POWER/LOSSES, Kw	2,818	3,298	2,250	964
BOP AUX POWER AND GSU TRANSFORMER LOSSES Kw	1,300	1,300	1,300	1,300
NET PLANT, Kw	95,482	95,002	96,050	98,644
FUEL INPUT/UNIT MMBTU/HR (LHV)	425.55	425.559	425.565	424.31
TOTAL FUEL INPUT/MMBTU/HR (LHV)	851.10	851.12	851.13	848.62
NET PLANT HEAT RATE				
BTU/KWH (LHV)	8,913.72	8,958.97	8,861.32	8,602.85
BTU/KWH (HHV)	9,849.66	9,899.66	9,791.76	9,506.15

STREAM NO.	1				2				3				4				5				6			
CASE	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
FLOW RATE (LB/HR)	109,800	117,775	100,255	52,810	15,000	15,000	15,000	–	43,520	53,355	31,755	1,375	81,020	81,020	81,020	70,195	55,702	55,702	55,702	48,258	25,320	25,320	25,320	21,935
FLOW RATE (GPM)	219.6	235.55	200.51	105.62	30	30	30	–	87.04	106.71	63.51	2.75	162.04	162.04	162.04	140.39	111.40	111.40	111.40	96.52	50.64	50.64	50.64	43.87
TEMP (F)	75	75	63	50	75	75	63	–	75	75	63	50	75	75	63	50	75	75	63	50	75	75	63	50

STREAM NO.	7A/B				8A/B				9A/B				10				11			
CASE	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
FLOW RATE (LB/HR)	27,851	27,851	27,851	24,129	22,960	22,960	22,960	24,129	4,891	4,891	4,891	0	33,850	41,500	24,700	1,240	2,595,000	2,595,000	2,595,000	120,000
FLOW RATE (GPM)	55.70	55.70	55.70	48.26	45.92	45.92	45.92	48.26	9.78	9.78	9.78	0	67.7	83	49.4	2.48	5,190	5,190	5,190	240
TEMP (F)	75	75	63	50	75	75	63	50	75	75	63	50	–	–	–	–	91.1	98.6	81.3	60

STREAM NO.	12				13A/B				14A/B				15A/B				16				17			
CASE	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
FLOW RATE (LB/HR)	2,595,000	2,595,000	2,595,000	120,000	980	710	3,700	0	1,312,920	1,624,163	951,479	–	1,312,926	1,624,163	951,479	–	9.670	11,855	7,055	135	2,500	2,500	2,500	2,500
FLOW RATE (GPM)	5,190	5,190	5,190	240	1.96	1.42	7.4	–	2,626	3,248.3	1,903	–	2626	3,248.3	1903	–	19.34	23.71	14.11	0.27	5	5	5	5
TEMP (F)	74.8	78.6	69.4	50	75	75	60	–	36	36	36	–	47	47	47	–	74.8	78.6	69.4	50	75	75	63	50

STREAM NO.	18				19				20A/B				21A/B				22A/B			
CASE	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
FLOW RATE (LB/HR)	0	0	0	0	34,990	37,175	32,375	22,070	1,008,767	1,008,767	1,009,131.6	HOLD	1,008,767	1,008,767	1,009,131.6	1,074,475.91	20,117.7	20,118.12	20,118.4	20,059.09
FLOW RATE (GPM)	0	0	0	0	69.98	74.35	64.75	44.14	–	–	–	–	–	–	–	–	–	–	–	–
TEMP (F)	75	75	63	50	74.9	76.15	64.4	50	100	115	72.2	18.0	46	46	46	32	250	250	250	250

STREAM NO.	23A/B				24A/B				25A/B				26A/B				27A/B			
EMMISSIONS / CASE	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
FLOW RATE (LB/HR)	1,056,736	1,056,736	1,057,101	1,118,664	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	99	99	99	99
FLOW RATE (GPM)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TEMP (F)	828.1	828.1	828.1	761.2	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	–	–	–	–
NOx, PPMVD, 15% 02	25	25	25	25													–	–	–	–
NOx, PPH	42	42	42	42													–	–	–	–
CO, PPMVD, 15% 02	40	40	40	60													–	–	–	–
CO, PPH	40	40	41	60													–	–	–	–
PM 10 PARTICULATES	–	–	–	–													–	–	–	–
NH3 SLIP, LB/HR PPMVD 15% 02	–	–	–	–													–	–	–	–

STREAM NO.	28A/B				29				30				31				32			
EMMISSIONS / CASE	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
FLOW RATE (LB/HR)	HOLD	HOLD	HOLD	HOLD	40,235.4	40,236.2	40,236.8	40,118.18	29,740	31,600	27,520	18,760	5196.5	5517.5	4,806	3,278	53.5	57.5	49	1.51
FLOW RATE (GPM)	–	–	–	–	–	–	–	–	59.48	63.2	55.04	37.52	10.393	11.035	9.612	6.557	0.107	0.115	0.098	0.063
TEMP (F)	HOLD	HOLD	HOLD	HOLD	75	75	75	75	74.9	76.15	64.4	50	–	–	–	–	–	–	–	–
NOx, PPMVD, 15% 02	2.5	2.5	2.5	2.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NOx, PPH	4.2	4.2	4.2	4.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO, PPMVD, 15% 02	6.0	6.0	6.0	6.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO, PPH	6.1	6.1	6.1	6.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PM 10 PARTICULATES	3.0	3.0	3.0	3.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NH3 SLIP, LB/HR PPMVD 15% 02	5.0	5.0	5.0	5.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

31rupfd2.dwg

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	–	9/5/03	9/5/03	–	9/5/03	9/5/03	9/5/03
INIT	–	WKW	LT	–	MAC	PR	KL

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
E	REV'D TO INCLUDE ZLD SCHEME	04/7/04	JAB	PR	JPB	JPB
D	ISSUED FOR BID	2/12/04	JAB	PR	JPB	JPB
C	ISSUED FOR REVIEW	1/26/04	JAB	PR	JPB	JPB
B	ISSUED FOR REVIEW	10/21/03	CEA	PR	JPB	DT
A	ISSUED FOR REVIEW	9/5/03	JAB	PR	JPB	DT

REFERENCE DRAWINGS

DSGN	PR	7/19/02
DRN	JAB	8/29/03
CKD	JPB	9/5/03

SCALE: NONE

FOR 22x34 DWG ONLY

POWER ENGINEERS

RIVERSIDE PUBLIC UTILITIES
RIVERSIDE ENERGY RESOURCE CENTER
PROCESS FLOW DIAGRAM

JOB NUMBER 101414
REV E
DRAWING NUMBER M2-1

the site for a 50-year storm event and will have an open bottom for infiltration. Overflow from the retention/infiltration basin, if it occurs, will flow on the surface to a storm water catch basin on the WWTP site approximately 200 feet east of the retention/infiltration basin.

2.9 Hazardous Material Management

Various chemicals will be stored and used during construction and operation of the proposed Project. All chemicals will be stored in appropriate storage facilities. Bulk materials will be stored in tanks or containers made of materials compatible with the intended contents. Quantities generally less than 55 gallons will be stored in delivery containers. All hazardous material storage and use areas will be designed to contain leaks and spills. Containment structures will be provided with sufficient volume to contain the spill of a full tank without overflow. All chemicals on-site will be stored, handled and used in accordance with applicable laws, ordinances, regulations and standards (LORS).

Of the chemicals used at the proposed facility, aqueous ammonia will be present in the greatest quantity and therefore presents the largest degree of risk of spills or releases. The aqueous ammonia will be stored on-site in a 12,000-gallon storage tank. To mitigate the risk associated with storing large quantities of aqueous ammonia, the storage tank facility will include secondary containment capable of holding 110 percent of the nominal 12,000-gallon tank capacity. Extra berm capacity shall be sufficient to hold precipitation from a 25-year, 24-hour event. The ammonia tanks will each be equipped with a pressure relief valve, a vapor equalization, vent and vacuum breaker. The ammonia delivery truck unloading station will include a curbed area that can contain the truck volume and prevent storm water runoff from entering the unloading area. The curbed truck drainage pad would slope toward a collection sump. The catch basin will be drained periodically to remove any accumulation of spills and rain water.

Small-quantity chemicals will be stored in their original delivery containers to minimize risk of upset. All hazardous materials storage vessels will be designed in conformance with the applicable local, state and federal LORS. All electric equipment will be specified to be free of polychlorinated biphenyls (PCBs).

Safety showers and eyewashes will be provided in all chemical storage areas. Service water hose connections will be provided near the chemical storage areas to facilitate flushing of leaks and spills of non-water reactive materials. Appropriate safety gear will be provided for plant personnel for use during the handling, use and cleanup of hazardous materials. Plant personnel will be properly trained in the handling, use and cleanup of hazardous materials used at the plant, and in procedures to follow in the event of a leak or spill. Adequate supplies of appropriate cleanup materials will be stored on-site. A Hazardous Materials Business Plan, in compliance with the California Hazardous Materials Release Response Plans and Inventory Act, will be prepared and submitted to the County Environmental Health Department for approval.

The construction, operation and maintenance of the plant will generate non-hazardous solid wastes typical of power generation facilities. Wastes generated during construction generally include soil, scrap wood, excess concrete, empty containers, scrap metal and insulation. Typical wastes generated during operation and maintenance includes scrap metal and plastic, insulation material, paper, glass, empty containers and other miscellaneous solid wastes. These materials will be collected for recycling or transfer to landfills in accordance with applicable regulatory requirements.

Hazardous wastes will be generated as a result of Project construction, operation and maintenance. The majority of hazardous wastes generated during construction will be liquid wastes such as waste oil and other lubricants from machinery operations, solvents used for cleaning and materials preparation, waste paints and other material coatings.

Hazardous wastes generated by the plant during operation will include spent SCR and oxidation catalyst, used oil filters, used oil and chemical cleaning wastes. Spent SCR and oxidation catalyst will be recycled by the catalyst supplier. Used oil filters will be recycled or disposed of at an offsite disposal facility. Used oil will be recovered and recycled by a waste oil-recycling contractor.

Chemical cleaning wastes consist of acid and alkaline cleaning solutions used for pre-operational chemical cleaning of piping. These wastes, which may have elevated concentrations of metals, will be tested. If hazardous, these and all other hazardous solid and liquid wastes will be disposed of in accordance with applicable LORS.

Workers will be trained to handle waste generated at the site in accordance with federal and state worker safety and health regulations.

The proposed Project will have a less-than-significant impact on the public or the environment through the routine transport and use of hazardous materials because these materials are consistently transported in similar industrial areas to similar facilities without incident. Transport of hazardous materials will follow all applicable federal Department of Transportation laws and other applicable LORS to minimize the potential for a transportation-related release.

2.10 Plant Auxiliaries

2.10.1 Lighting

The lighting system will be provided in accordance with IES Standards, and will include normal and emergency lighting systems.

The indoor lighting system will be high-pressure sodium (HPS) or fluorescent type. The lighting system in the control room, training room and operation room will be provided with a dimmer system and 125VDC incandescence emergency lighting system. In other indoor area, a battery pack type emergency fixture shall be used.

Outdoor lighting is high pressure sodium vapor type and provides illumination in areas of normal personnel traffic, such as:

- Roadway lighting
- Fence security lighting (including security camera lighting)
- Power block platform, operation and maintenance area lighting

AC (normal) and DC (emergency) lighting for CTG interior lighting is provided by the CTG supplier as an integral part of packaged power plant.

2.10.2 Fire System

The fire protection system will comply with City underwriters requirements and the local Fire Marshal. Electrical components associated with the fire protection shall be listed and approved by the California Fire Marshal.

Fire Water

The raw water tank will provide a fire water reserve that meets National Fire Protection Act (NFPA) and the California Fire Code fire flow requirements. Estimated fire flow for the facility is 1,500 gpm for two hours or 180,000 gallons.

Fire Water Pumps

Fire water pumps supply the facility fire loop with fire water. The fire pump system includes two electric motor driven fire pumps (100 percent capacity each) and one electrical motor driven jockey pump to maintain system pressure. The fire pump system will provide at least 1,500 gpm. The fire pump system includes all electrical components, wiring and controls necessary for reliable and uninterruptible operation. Fire pump system alarm and trouble signals are provided for annunciation in the plant control system.

Fire Water Loop Piping

Fire water loop piping will be ductile iron with self-restraining mechanical joints. The fire water piping will be installed underground. Above ground piping will be galvanized steel.

Post indicator valves will be provided and located to isolate portions of the loop during repairs while still allowing fire water to be available in other portions of the loop. An isolation valve will be provided for each hydrant to allow for maintenance or repair without shutting down the fire loop.

All pipe, fittings, valves, hydrants and all other components will be UL and/or FM approved.

Buildings

All construction materials that are to be a part of the completed plant will be non-combustible. Two-hour fire barriers will be provided in the control room, warehouse and shops.

2.11 Electrical System

Each Combustion Turbine Generator (CTG) electrical distribution system consists of 15kV switchgear, 13.8 –4.160kV MV Transformer throat connected to a 4160V MCC via main breaker, 13.8-0.48kV Station Auxiliary Substation Transformer throat connected to a 480V Switchboard via a main breaker, 480V MCCs, 125VDC distribution system, 120VAC UPS distribution system, and other low voltage power distribution equipment.

The transformers will be outdoor oil-filled type. The 4160V MCC, the 480V Switchboards and 480V MCCs (except the 480V MCC supplied with the CTG) will be located outdoors. The 125VDC and 120VAC UPS distribution systems will be located indoors.

Copper insulated cable will be used to distribute power throughout the plant. The cable will be installed in the plant's raceway system, which will consist of tray, conduit and underground concrete encased duct bank, as required.

A comprehensive grounding and lightning protection system will be installed and include a copper ground grid with ground rods. All equipment grounding taps, metal structure and other major equipment will be grounded to the grounding grid. The lightning protection will be installed to help protect the plant from lightning strikes.

The plant will also be provided with a telephone system and security camera system.

Limited black start power will be provide from the existing Cogeneration Plant at the WWTP. Both 200A at 4160V and 800A at 480V will be used to black start one unit at a time when power from the 69kV substation not available.

2.12 Transmission System

Currently, a 69kV transmission line connects the Mt. View and Riverside substations, which are both owned and operated by the City. The RERC will be looped into this existing transmission line approximately 400 feet outside Mt. View Substation, establishing two segments: Mt. View to the RERC generation substation and Riverside Substation to the RERC generation substation. From the intercept point, the double-circuit 69kV line will extend approximately 9,000 feet to the RERC facility. No outside utilities are involved.

The new double-circuit 69kV line will be comprised of self-supporting galvanized steel and/or wood poles with top-of-pole heights near 80 feet. Conductor selection for the new line is anticipated to be 954 ACSR (aluminum conductor steel reinforced). The existing line is 653.9 ACSR. The last spans into Mt. View from where the new line loops in will also be upgraded to 954 ACSR as part of this Project. The 12kV underbuild will be placed on cross arms and customer services will be transferred to the new poles. Existing communications circuits (cable and phone) will also be transferred and the City will extend its fiber optic loop from Mt. View to the RERC facility, thereby adding a fiber optic communications circuit to the new line.

The proposed 69kV transmission line from the RERC facility would run south along the east side of Payton Avenue for approximately 1,200 feet. It would turn east at Jurupa Avenue, and follow along the south side of Jurupa Avenue for approximately 7,000 feet to Sheppard Street where it will turn southeast and run along the southwest side of Sheppard Street for approximately 800 feet until it reaches the Mt. View Substation.

2.13 Plant Controls

The plant instrumentation and control system will be designed to allow the operators to achieve safe and reliable operation of the power plant. Major equipment monitoring, control and operation will be provided from the control room using the plant control system (PCS) control consoles. The integration of the various plant systems will be accomplished by the PCS. The PCS will be used for supervisory control and monitoring of major plant components and package systems, such as the combustion turbine generator, and it will be used for direct control of SCR loops and other balance-of-plant equipment and processes.

A full-function operator workstation will be located at the Utilities Operations Center (UOC). From this Human Machine Interface (HMI), monitoring of the CTGs and full control and monitoring of the balance-of-plant equipment will be possible. The UOC is approximately 4 miles from RERC.

2.14 Demand Conformance

As a result of Senate Bill 110, which took effect on January 1, 2000, the California Energy Commission is no longer required to determine if a proposed project conforms with an integrated assessment of need and with the specific requirement to show that a project's generating capacity not be substantially in excess of the resources shown in the integrated assessment of need.

Senate Bill 110 states:

"Before the California electricity industry was restructured the regulated cost recovery framework for power plants justified requiring the commission to determine the need for new generation, and site only power plants for which need was established. Now that power plant owners are at risk to recover their investments, it is no longer appropriate to make this determination."

2.15 Facility Closure

Facility closure refers to a ceasing of plant operations either temporarily or permanent. Temporary closure is a temporary plant shutdown for extended periods. This does not include outages for normal maintenance. Temporary closure can be caused by major equipment overhaul/replacement or by significant disruptions to the gas supply, water supply or power delivery systems. Temporary closures can also be a result of significant damage to the plant due to various events (earthquake, fire, flood, equipment failures, etc.). Permanent closure is a long-term permanent cessation of operations where there are no plans for re-commissioning the plant. A permanent plant closure could be due to significant damage that it deemed to be economically or physically beyond repair, due to plant age, unfavorable market conditions, etc. Temporary and permanent closures are discussed in more detail below.

Temporary closures can be divided into two categories: 1) closures due to the spill/release of hazardous materials, and 2) those NOT due to the spill/release of hazardous materials.

Temporary closures due to an actual spill/release or a threatened spill/release of hazardous materials will follow the Hazardous Material Business Plan developed for the Project site. The procedures outlined in the Hazardous Material Business Plan will include methods to control and contain the spill/release, proper response from trained plant personnel, notification of the proper authorities and the public, and clean up/mitigation procedures for the spill/release. After these steps are completed, the temporary closure of the plant will proceed as described below for a temporary closure NOT due to the spill/release of hazardous materials.

Temporary closures NOT due to the spill/release of hazardous materials can include closure caused by major equipment overhaul/replacement, by significant disruptions to the major utilities (gas, water, or power delivery systems), and by significant damage to the plant due to various events (earthquake, fire, flood, equipment failures, etc.). For these types of temporary closures, additional plant security will be added as needed. A plan will be implemented for proper cessation of operations. The plan will ensure conformance with applicable laws, ordinances, regulations and standards (LORS) and ensure the protection of public health and safety and protection of the environment. Depending upon the length of the temporary closure and the expected ambient temperatures, the plan may include draining of water based systems, draining of chemicals, nitrogen purge of equipment and safe shutdown/lay-up of equipment. All water and chemicals drained will be disposed of in accordance with the applicable LORS.

Permanent closure could be due to significant damage that it deemed to be economically or physically beyond repair, due to plant age, due to unfavorable market conditions, etc. Although the plant is designed for a 30 year life, the actual life may be less than or more than 30 years depending upon many factors such as premature equipment failures, aging of equipment, level of maintenance performed, cost of maintenance and operation, fuel pricing, etc.

Permanent closure of the plant may range from abandoning in-place to removal of all equipment and systems from the site, dependent upon the conditions at that time and the intended future use of the site. Since this information is unknown and highly variable, a specific procedure/plan (decommissioning plan) will be developed and submitted to the California Energy Commission and the City of Riverside when the situation and timing becomes known. The plan will ensure conformance with applicable laws, ordinances, regulations and standards (LORS) and ensure the protection of public health and safety and protection of the environment.

As a minimum, the decommissioning plan will contain the items outlined below.

- Proposed decommissioning activities for the plant, equipment and systems associated with the plant.
- Conformance of the decommissioning plan to applicable LORS.

- Activities required to restore the site if the plan calls for removal of all equipment and systems.
- Alternatives for plant decommissioning other than complete site restoration.
- Estimated costs for the proposed decommissioning including the source of the funds to be used for decommissioning.

The decommissioning plan will encourage recycling of equipment and materials from the plant. If possible, unused chemicals and oils will be sold/given back to the suppliers or to other users. Used chemicals and oils, along with all hazardous and non-hazardous wastes will be collected and disposed of in accordance with applicable LORS in appropriate landfills or waste collection facilities if they can not be recycled. Equipment containing chemicals and oils will be drained and shut down to ensure public health and safety and to protect the environment. Site security will be maintained during the decommissioning period as needed.